Amendments to the Specification:

Please amend the last paragraph of page 1 as follows:

This problem is solved by the invention by a method of the initially cited kind wherein the microphone system comprises at least two microphone sub-systems of which the transfer characteristics differ in relation to said direction regarding the electric output signals of each, and in that the output signal is formed as a mathematical product which is saturated at a predetermined or predeterminable value, the ratio of the output signals from the said microphone ~~sub-assemblies~~ sub-systems being a factor in said product.

a1

Please replace the equations on page 2 at about line 16, and page 7, about line 19, with the following equation:

a2

$$S = c_n \cdot \left\{ A - \left[\alpha \cdot \frac{|c_z|}{|c_n|} \right]_{satB} \right\}$$

Please replace the paragraph starting at line 20, below the equation, with the following double spaced paragraph:

where

a3

S is the output signal of the microphone system, A is predetermined or predeterminable signal value, $/c_n/$ is

a3 cont

the amplitude of the output signal from a first sub microphone-system of which the transfer characteristic is at a maximum gain at one angle of incidence, the characteristic to be formed also being at maximum gain, $/c_z/$ is the output-signal amplitude of the second sub microphone-system, satB is the ratio saturation at a predetermined or predeterminable maximum signal value B, and α is a predeterminable or predetermined factor.

Please delete the second full paragraph on page 3, starting with the words "preferred embodiment variations…"

Please amend the fourth paragraph on page 4 as follows:

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a4

A first sub-microphone system is designed with a three-dimensional transfer characteristic shown in two dimensions in Fig. 1a and relating to its transfer or gain features of acoustic signals incident on said system from the direction φ. Fig. 1b is similar to Fig. 1a of a transfer characteristic of a second sub-microphone system which is assumed mirror-symmetrical to the axis $\pi/2$; $3\pi/2$ of the transfer characteristic of the first sub-microphone system. The transfer characteristics of Figs. 1a and 1b ~~resp.~~ respectively are denoted by [[c_d]] --c_n-- and [[c_d]] --c_z--.

Please amend the fifth paragraph on page 4 as follows:

a5

In Fig. 2, the transfer functions [[c_d]] --c_n-- and [[c_d]] -- c_z-- are shown qualitatively and in dB relative to the φ coordinate axis of Figs. 1a and 1b.

Please amend the sixth paragraph on page 4 as follows:

a6

As regards the acoustic unit signals incident on the two ~~sub~~ microphone sub-systems, the transfer characteristics shown in Figs. 1a and 1b simultaneously correspond to the signal values at the outputs of the ~~sub~~ microphone sub-systems under consideration.

Please amend the seventh paragraph on page 4 as follows:

a7

In the invention a ratio Q is formed from these two values of output signals, again denoted by [[c_d]] --c_n-- and [[c_d]] --c_z--, for instance

Please replace the equation on line 23 of page 4 with the following equation:

a8

$$Q = \frac{|c_z|}{|c_n|}$$

Please amend the last paragraph on page 4, continuing on page 5, as follows:

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a9

This ratio leads to the function Q shown qualitatively in dot-dash lines in Fig. 2 with a singularity at $\varphi = \pi$. When the ratio is real, the singularity resulting at the null position of the denominator [[$|c_d|$]] --$|c_n|$-- is anyway clipped, that is, the ratio function Q is saturated. Preferably the ratio is saturated at a predetermined or predeterminable value B, preferably as shown in Fig. [[1]] 3 at the value "1" at the maximum value of the transfer functions of Figs. 1a, 1b of "1".

Please amend the paragraph at the bottom of page 5 and continuing to the top of page 6 as follows:

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a10

For reasons of clarity, the saturated-ratio function Q_{sat1} is shown with a linear gain scale in Fig. 3 at 1. Fig. 3 further shows that in the unsaturated angular ranges, in the present case between 0 and ½ π and between 3π/2 and 2π, the saturated ratio Q_{sat1} is a directional transfer-characteristic function. If now specific directional characteristics are desired for the transfer characteristic, then the range of the ratio which was set in the invention to a predetermined saturation value, in this case to 1, shall be used to achieve therein, that is within this

angular range, a defined minimum gain in the desired transfer characteristic. This goal is attained in the embodiment being discussed in that the saturated ratio is subtracted from a predetermined or predeterminable fixed value A, in the present illustration for instance and preferably having the value of 1. The result is a function F again shown as a full line in Fig. 3,

a10 cont

$$F = A - Q_{satB}$$

or, as a special and preferred case

$$F = 1 - Q_{sat1} .$$

It follows that a transfer function F was attained with a vanishing signal gain except in the range $0 \leq \varphi \leq \frac{1}{2}\pi$ and ~~$3\pi/2 < \varphi < \pi$~~ $\underline{3\pi/2 \leq \varphi \leq 2\pi}$.

Please replace the paragraph of page 6 starting at line 17 to line 20 with the following paragraph:

-- Even though the saturated product might be used in the form of another function, generally therefore as:

a11

$$F = F\left[(\alpha \cdot Q)_{satB}\right]$$

far more preferably the implementation of a directional characteristic shall be by means of subtracting the said

a11 cont

saturated product from a predetermined or predeterminable fixed value.

Please replace the equation on page 7 about line 23 with the following equation:

a12

$$S' = c_n \cdot \left\{ 1 - \left[1 \cdot \frac{|c_z|}{|c_n|} \right]_{sat1} \right\}$$

Please replace the equation on the top of page 8 with the following equation:

a13

$$S'' = c_n \cdot \left\{ 1 - \left[4 \cdot \frac{|c_z|}{|c_n|} \right]_{sat1} \right\}$$

Please amend the paragraphs on page 8 through 10 as follows:

a14

Fig. 6 illustratively shows a microphone system operating in the manner of the method of the invention by means of a simplified signal-flow functional block diagram and especially applicable also to hearing aids.

As shown in Fig. 6, the microphone system comprises at the input side a system 1 with at least two ~~sub~~ microphone sub-systems 1a and 1b. The output signals [[O_{1a}]] --A_{1a}-- and [[O_{1b}]] --A_{1ab}-- at the outputs of said sub-systems are a function of the

direction φ of the acoustic signals incident on the input-side microphones. As shown in Fig. 6, the two sub microphone-systems ~~definitely~~ may consist of a single pair of microphones of which the outputs are coupled to each other in the "delay-and-add" technique. What is essential is that basically the signals at the outputs [[O_{1a}]] --A_{1a}-- and [[O_{1b}]] --A_{1ab}-- are of different transfer characteristics as regards the acoustic signals incident at an angle φ.

a14 cont

Preferably the output signals [[O_{1a}]] --A_{1a}-- and [[O_{1b}]] --A_{1ab}-- are fed to time-domain/frequency-domain converter FFT units ~~FFT~~ 3a and 3b ~~resp~~. respectively provided and, as preferred, the subsequent signal processing take place in the frequency domain. Said outputs are operationally connected to inputs I_{5a} and I_{5b} ~~resp~~. respectively of magnitude-forming units 5a and 5b. The outputs of said magnitude-forming units are, as represented in Fig. 6, fed to the numerator and denominator inputs [[N]] --Z-- and [[D]] N, respectively, of a divider unit 7. The output signal [[O_7]] --A_7-- is multiplied by a weighting unit 9 by a predeterminable or predetermined weighting factor α present at the control input [[C_9]] --S_q--and is

operationally connected to the input [[I_{11a}]] --A_{11a}-- of a subtraction unit 11.

As shown in dashed lines in Fig. 6, the divider unit 7 and the weighting unit 9 constitute a weighted ratio-forming unit 10. The factor α which illustratively in Fig. 6 is shown adjustable at the weighting unit 9 may assume values arbitrarily different from 0.

a14 Cont

Fig. 6 furthermore diagrammatically shows the signal at the output [[O_9]] --A_9-- of the weighted ratio-forming unit 10 being fed to a saturation unit 12 of which the output is first fed to the input [[I_{11a}]] --A_{11a}--. The output signal of the weighted ratio-forming unit 10 may be saturated downward at the saturation unit 12 –which obviously may be integral with this weighted ratio-forming unit 10– (shown dashed in the block 12 of Fig. 6) and/or upward at a predetermined or predeterminable value B (as schematically indicated at the input "satB". Preferably this setting shall also be at a maximum value. The signal applied to the subtraction unit 11 is subtracted from the fixed value A which is set or can be adjusted at the second input I_{11b}. The output signal [[O_{11}]] --A_{11}-- of the subtraction unit 11 is

operationally connected to the input I_{13a} of a multiplication unit 13 of which the second input I_{13b} receives the output signal of that microphone sub-system 1a which is also applied to the denominator input N of the divider unit 7. If it is desired to change the angular saturation range discussed in Figs. 1 through 3, then the denominator signal and where called for also the numerator signal, which are fed to the inputs ~~D and N resp.~~ N and Z, respectively, of the divider input 7, may be weighted further.

a/14 cont

The output signal S_{out} of the microphone system of the invention appears at the output of the multiplier 13. Said signal includes the desired transfer characteristic as a function of the solid angle φ at which acoustic signals impinge on the input of the microphone system 1.

As already mentioned, preferably the selected transfer characteristics of the microphone sub-systems 1a and 1b shall be identical but mutually directionally opposite characteristics. By adjusting the weighting factor α , the saturation value B, the fixed value A, and, where called for, further weighting factors such as ß, the desired transfer

characteristics shall have been adjusted at the output signal S_{out}.

a14 cont

The method of the invention and the microphone system of the invention are unusually appropriate for hearing aids, also on account of economical signal processing and, as shown by Figs. [[3]] --5-- and 4, the remarkable ability to suppress signal transmission from undesired directions of incidence, for instance to the rear of a hearing aid. As regards hearing aids, preferably the ~~sub~~ microphone sub-systems having cardioid characteristics Ca shall be replaced with sub-systems having hypercardioid characteristics [[H_{ca}]] --Hca-- (Fig. 5).